B. Sc. (Part - I) : Physics Paper - II

Kinetic Theory and Thermodynamics

P. Pages : 4

Time : Three Hours   Max. Marks : 40

Note : 1. All questions are compulsory.
2. Draw neat diagrams wherever necessary.

Either

1. a) State any four assumptions of kinetic theory of gases. **2**

   b) State and prove law of equipartition of energy.**3**

   c) Give the kinetic interpretation of temperature. **3**

OR

2. p) State Avogadro's law. **1**

   q) Derive Vander Waal's equation of state for real gas. **5**

   r) What are degrees of freedom ? Find degrees of freedom for monoatomic gas. **2**

Either

3. a) What is Joule Thomson Effect ?   1

   b) Describe with neat diagram porous plug experiment for liquification of gases.   4

   c) Obtain an expression for the coefficient of thermal conductivity of a gas.   3

OR

4. p) Describe with neat diagram Method for liquefaction of Hydrogen.   4

   q) Describe with neat diagram method for liquefaction of Helium.   4

Either

5. a) Explain   3
   i) Reversible process.
   ii) Irreversible process with one example of each.

   b) What are the limitations of first law of thermodynamics.   2

   c) On the basis of first law of thermodynamics explain (i) free expansion (ii) Cyclic process. **3**

OR

6. p) State zeroth law of thermodynamics.   1

   q) State and prove carnot's theorem.   4

   r) A Carnot's engine works between the steam point and ice point. Find its efficiency.   3

Either

7. a) Define extensive and intensive variable.   2

   b) Derive Clausius - Clapeyron's latent heat equation by using Maxwell's thermodynamics relation.   5

   c) Define Internal energy function (U)   1

OR

8. p) Explain the enthalpy function (H).   2

   q) Derive Maxwell's thermodynamical relation

$$\left(\frac{\partial P}{\partial T}\right)_V = \left(\frac{\partial S}{\partial V}\right)_T$$

    3

   r) Derive Maxwells thermodynamical relation

$$\left(\frac{\partial T}{\partial V}\right)_S = -\left(\frac{\partial P}{\partial S}\right)_V$$

    3

Either

9. a) What is perfectly black body ?   2

b) State and explain Stefan's law of radiation.   3

c) State and Explain Boltzman's law.   3

OR

10. p) State and prove Wein's displacement law.   3

q) State and prove Rayleigh - Jean's law.   3

r) What is ultraviolet catastrope ?   2

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